



BOOK OF PROCEEDINGS

**Biennial Conference on
*Interdisciplinary Studies***

FACULTY OF MANAGEMENT AND SOCIAL SCIENCES

GODFREY OKOYE UNIVERSITY

**(The Catholic University of Enugu)
ENUGU STATE**



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Interdisciplinary Studies (BCIS)**

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FIRST PUBLISHED 2017

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ISBN: 978-978-54384-8-2

Printed by:
GO University Press
Thinker's Corner, Enugu
08094943013

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Abstract

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Chapter Twenty One

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Abstract

This paper navigates the role of philosophy in biology education with particular reference to Nigeria. It x-rays the importance and connectivity of philosophy to all knowledge and life as a whole. It went further to look at the relevance of philosophy to biology education connectivity to all facts of life. Then using the basic tenets of the logical empiricism and dominant school of thought in philosophy of Science, the paper describes the role philosophy can play in biological evolution. Finally the paper explores the role of biology education to national development.

Introduction

The problem encountered by biology education in Nigeria, among others is its negligence of direction which lies on theory and philosophy. The philosophy should be the basis of national policy on science education with reference to Biology Education.

Education is the process of teaching training and learning especially in schools to improve knowledge and develop skills. Fafunwa (2004) defined education as “an aggregate of all the processes by means of which a person develops abilities, attitude and other forms of behaviour of positive value in society in which he lives”. This is functional education and Nigeria as a nation realized that it is important for the good and services of mankind. This realization is enshrined in National Policy on Education (FRN, 2014). It was emphasized that the overall philosophy of education in Nigeria among others should be directed to building a united, strong and self reliant nation by educational activities been deared towards scientific and technological process. Biology education is a veritable instrument for the development of any nation and that is why the Nigerian government must invest seriously in all schools especially in the higher institutions where qualified personels as future biology teachers are produced. Specifically, biology education exposes students to laboratory skills and acquiring of various principles, concepts, theories, laws and conceptual schemes of biology, the end product of which are job opportunities, diversified economy, less dependent on oil and gas leading to national development. Since the corner stone of the value of philosophy as a worldview and methodology is the degree to which it is interconnected with life, and biology as a science of life and education concomitant with life, it become imperative to explore the role of philosophy in biology education.

Relevance of Philosophy to Science Education

Philosophy is the study of general and fundamental problems concerning matters such as existence, knowledge, values, reason, mind and language. It is literary called love of wisdom. The terms were



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coined by the pre-Socratic thinker Pythagoras. Major sub-fields of academic philosophy include metaphysics which is concerned with the fundamental nature of reality and being; and epistemology which is about the nature and grounds of knowledge and its limit and validity; logic, philosophy of science and the history of Western philosophy. However, this paper is delimited to philosophy of science. Philosophical method includes questioning, critical discussions and thinking, rational argument and systematic presentation of ideas. It is the general and fundamental study of almost any topic, be it in science, arts and religion. It encompasses anybody of knowledge.

As a special form of social consciousness, constantly interacting with all its other forms, philosophy is their general theoretical substantiation and interpretation. The quality of philosophy developing by itself without the support of science; and science working without philosophy has agitated the mind of sound people. While some think that sciences can stand apart from philosophy and that scientists should actually avoid philosophising has been understood as groundless and therefore generally vague theorising.

Philosophy of science and science education in Nigeria.

Philosophy of science is very relevant to science education both in theory and practice. Take for instance the explanation of the recourse to philosophy of science in formulating a theory of conceptual change to explain learning, the negative effect of misconception on learning. Strike (1983) asserts that it is "epistemology, not psychology that is the basic discipline for the study of learning". Philosophy of science is a branch of philosophy concerned with the foundations, methods and implications of science.

Lambert and Brittan (1979) described three basic preoccupations of philosophers of science as determining what represents an adequate scientific worldview by asking critical questions about it; have concern with the analysis of science concepts to reveal the logic and structure of scientific disciplines and described what it is that scientists do. This includes problems related to explanation, confirmation and theories. Apart from philosophy of science being generally relevant and connected to science education, biology education can also look to philosophy of science for guidance in the solution of problems related to biological concepts, theories and laws as well as curriculum and instruction in general.

Relevance of philosophy of science to biological evolution

Evolution is defined as any genetic change in a population that is inherited over several generations. These changes can be small or large, noticeable or not so noticeable. In order for an event to be considered an instance of evolution, changes have to occur on the genetic level of a population and be passed on from one generation to another. Invariably the alleles in the population change and are passed on; which are phenotypically expressed in the population. Evolution is gradual process by which the present diversity of plant and animal life arose from earliest primitive organisms, which is believed to have been continuing for at least the past three hundred million years. Before the middle of 18th century, it was generally believed that each species was divinely created and fixed in its form throughout existence. It was actually by this middle of 18th century that the first theory to explain how one species could have evolved into another was proposed by biologist named Jean Bactiste de Lamarck. However, it was the publication of "on the origin of species" by Charles Darwin in year 1859 that seriously challenged the theory of special creation. Charles Darwin was a British biologist who studied medicine and later studied geology. He formulated his theory of evolution by natural selection. This theory is known as Darwinism. Darwinism as contained in 'the origin of species' postulated that



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- i. Present day species have evolved from simplest ancestral type by the process of natural selection, acting on the variability found within populations.
- ii. All living organisms are constantly involved in a struggle for existence.
- iii. Some variations are more favourable to existence in a given environment than others
- iv. In a population, those that tend to survive and reproduce are the individuals whose variations give them competitive advantage over the rest. These are the fittest in that they are adapted to their environment, (ie survival of the fittest)
- v. The favourable variations which they possess are passed on to their offsprings.

Neo-Darwinism which is the current theory of evolution formulated between 1920 and 1950 combined evidence from classical genetics with the Darwinian theory of evolution by Natural Selection it made use of modern knowledge of genes and chromosomes to explain the source of genetic variation upon which selection works. Evolution is a scientific theory propounded by Charles Darwin because it gives explanations and predictions for naturally occurring phenomena based on observations and experimentations. This type of theory attempts to explain how events seen in the natural world work. The scientific theory which is also philosophical because it must be testable, falsifiable and substantiated by factual evidence. It is more of critical thinking and confirmation of reasonability of accepting a theory as a viable explanation for a particular event. It is also necessary to take philosophy of science into consideration because it defines what biology as a science is and when the philosophy changes, the nature of science changes, hence the need for corresponding changes in biology teaching. The biology teachers should be aware of the various schools of thought in the philosophy of science for guidance in their work. For instance Hill (1974) has described the structure of theories in biology; and theory of evolution by Charles Darwin. Other components of biology that are described by the philosophers are processes and ethics. The processes include the method by which biologists gain their knowledge while the ethics of the discipline include the standards, which guide their work. In conjunction with philosophy of science, the theory of evolution, has caused controversy from the time of its introduction. This controversy comes from the perception that biological evolution is at odds with religion concerning the need for a divine creator. Evolutionists contend that evolution and science in general do not address the issue of existence of God, but attempt to explain how natural processes work.

Nevertheless, there is no escape from the fact that evolution contradicts certain aspects of some religious beliefs. For instance, the evolutionary account for the existence of life and the biblical account of creation are quite different.

Evolution suggests that all life is connected (macro evolution) and can be traced back to one common ancestor. A literal interpretation of biblical creation suggests that life was created by an all powerful supernatural being (God). Still others have tried to merge these two concepts by contending that evolution does not exclude the possibility of the existence of God, but merely explains the process by which God created life. This view is still contradictory to a literal interpretation of creation as presented in the bible. The main disagreement between proponents of the two issues (the evolutionists and



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creationists) lies on the concept of macroevolution which refers to the process of evolution that takes place on the level of species in which one evolves from another.

Importance of biology education to National development

It is important to note that improved educational standard is always the result of determination and conscious planning. Exciting discoveries and applications based on biology have been made for the reduction of the lingering problems of hunger and poverty among almost a quarter of humankind. Profound challenges face the nation even as we have advanced technologically. Nevertheless, biology education has offered great scope to meeting these challenges especially in the area of assurance of food security and in the use of biology to meet the needs for more fuel, fiber and animal feed (Teng, 2007). Biology education has driven mankind to develop interest in "bio business" premised mainly in the potential of the new life science industry to spill over into pharmaceuticals and biomedical applications with the rapid developments in biotechnology (Gurinder, 2004).

Actually the use of biological knowledge which biology education provides to serve human needs is not new and neither are the enterprises associated with exploiting that knowledge, but for the provision of food, feed, beverages, fiber etc. The advent of modern, technologies and new biological knowledge has vastly expanded the application of biology. Biology education started with our early ancestors who domesticated plant and animals and with the selective breeding of preferred species, they formed the biological foundation for today's plant and animal varieties, many of which are vastly different from their original parents (effect of evolution and variation). Infact, few of today's crops are unimproved or harvested from the wild. The bulk of fish is now farmed, not captured from the wild. A Bioscience Enterprise is any commercial activity which involves the application of biology and the understanding of life processes and creates economic value for its owner (Teng, 2008). This bio enterprise has brought about enviable national sustainability and development in Nigeria especially in the production of raw bio commodities, high quality seed material using hybrids, high quality seed material using tissue culture, bio fermentation, bio fertilizer, bio pesticides and bio fuels. It is therefore imperative that biology education is a pivotal knowledge component to meeting mankind's requirements and thereby contributing to sustainable development of a nation.

Conclusion

The role of philosophy in biology education cannot be over emphasized. Philosophy being the general and fundamental study of all facts of life and s such any topic be it science or arts. Philosophy is therefore the theoretical and substantiation of biology education as enshrined in the national policy of education in Nigeria. This is clearly demonstrated in the relevance of philosophy in biological evolution. Evolutionary theory suggests that all life is connected and can be traced back to one common ancestor. Philosophy is therefore fundamental to the study of evolution.

Recommendations

The teaching of biology is advocated as a necessary part of national development, implicitly, sustainable development, when issues of life and environment are concerned. Conceptually biology education at the secondary school level requires a sound understanding of andragogy achievable through well planned and executed educational programmes in schools and in adult populations, and focused as biological entrepreneurship.



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There is also need for biology teachers to relate their teaching to entrepreneurial acquisition as in Agriculture, Apiculture, enzyme extraction, Horticulture and even frog breeding for biological control of mosquito. This diversification of economy will go a long way to national sustainability and development inspite of the down trend in oil and gas sector.

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